Table R1 Guidelines for Horizontal and Vertical Setback Distances

Site feature	Setback distance range (m)[1]	Site constraint items of specific concern (see Table R2)[1]
Horizontal setback distance (m)		
Property boundary	1.5 - 50.0[2]	A, D, J
Buildings / houses	2.0 - 6.0[3]	A, D, J
Surface water[4]	15.0 - 100.0	A, B, D, E, F, G, J
Bore, well[5, 6]	15.0 - 50.0	A, C, H, J
Recreational areas, children's play areas, swimming pools[7]	3.0 - 15.0[8, 9]	A, E, J
In-ground water tank	4.0 - 15.0[10]	A, E, J
Retaining wall, embankment, escarpment, cutting[11]	3.0 or 45° from toe of wall (whichever is greatest)	D, G, H
Vertical setback distance (m)		
Groundwater[5, 6, 12]	0.6 - 1.5	A, C, F, H, I, J
Hardpan, bedrock	0.5 - 1.5	A, C, J

A number of qualifying notes apply:

1. The overall setback distance should be commensurate with the level of risk to public health and the environment. For example, the maximum setback distance should be adopted where site / system features are on the high end of the constraint scale. The setback distance should be based on an evaluation of the constraint items and corresponding sensitive features in Table R2 and how these interact to provide a pathway or barrier for wastewater movement.
2. Subject to local regulatory rules and design by a suitably qualified and experienced person, the separation of a drip line system from an upslope boundary, for slopes greater than 5%, may be reduced to 0.5m.
3. Setback distances of less than 3m from houses are appropriate only where a drip irrigation land application system is being used with low design irrigation rates, where shallow subsurface systems are being used with equivalent low areal loading rates, where the risk of reducing the bearing capacity of the foundation or damaging the structure is low, or where an effective barrier (designed by a suitably qualified and experienced person) can be installed. This may require consent from the regulatory authority.
4. Setback distance from surface water is defined as the areal edge of the land application system to the edge of the water. Where land application areas are planned in a water supply catchment, advice on adequate buffer distances should be sought from the relevant water authority and a hydrogeologist. Surface water, in this case,

refers to any fresh water or geothermal water in a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in man-made drains, channels, and dams unless these are to specifically divert surface water away from the land application area. Surface water excludes any water in a pipe or tank.

5. Highly permeable stony soils and gravel aquifers potentially allow microorganisms to be readily transported up to hundreds of metres down the gradient of an on-site system (see R3, Table 1 in Pang et al. 2005). Maximum setback distances are recommended where site constraints are identified at the high scale for items A, C, and H. For reading and guidance on setback distances in highly permeable soils and coarse-grained aquifers see R3. As microbial removal is not linear with distance, data extrapolation of experiments should not be relied upon unless the data has been verified in the field. Advice on adequate buffer distances should be sought from the relevant water authority and a hydrogeologist.
6. Setback distances from water supply bores should be reviewed on a case-by-case basis. Distances can depend on many factors including soil type, rainfall, depth and casing of bore, direction of groundwater flow, type of microorganisms, existing quality of receiving waters, and resource value of waters.
7. Where effluent is applied to the surface by covered drip or spray irrigation, the maximum value is recommended.
8. In the case of subsurface application of primary treated effluent by low pressure effluent distribution (LPED) irrigation, the upper value is recommended.
9. In the case of surface spray, the setback distances are based on a spray plume with a diameter not exceeding 2m or a plume height not exceeding 0.5m above finished surface level. The potential for aerosols being carried by the wind also needs to be taken into account.
10. It is recommended that land application of primary treated effluent be down gradient of in-ground water tanks.
11. When determining minimum distances from retaining walls, embankments, or cut slopes, the type of land application system, soil types, and soil layering should also be taken into account to avoid wastewater collecting in the subsoil drains, or seepage through cuts and embankments. Where these situations occur setback clearances may need to be increased. In areas where slope stability is of concern, advice from a suitably qualified and experienced person may be required.
12. Groundwater setback distance (depth) assumes unsaturated flow and is defined as the vertical distance from the base of the land application systems to the highest seasonal water table level. To minimise potential for adverse impacts on groundwater quality, minimum setback distances should ensure unsaturated, aerobic conditions in the soil. These minimum depths will vary depending on the scale of site constraints identified in Table R2. Where groundwater setback is insufficient, the ground level can be raised by importing suitable topsoil and improving effluent treatment. The regulatory authority should make the final decision in this instance (See also the guidance on soil depth and groundwater clearance in Tables K1 and K2).

Table R2 Site Constraint Scale for Development of Setback Distances

Item	Site constraint items of specific concern	Constraint scale[1]		Sensitive features
		Lower	Higher	
		Examples of constraint factors[2]		
A	**Microbial quality of effluent[3]**	Secondary treated effluent with disinfection	Primary treated effluent (no disinfection)	Groundwater and surface pollution hazard, public health hazard
B	**Surface water[4]**	Category 1 to 3[5] soils no surface water down gradient within 100m; low rainfall area	Category 4 to 6 soils permanent surface water <50m down gradient, high rainfall area, high resource/environmental value[6]	Surface water pollution hazard for low permeability soils, low lying or poorly draining areas
C	**Groundwater**	Category 5 and 6 soils, low resource/environmental value	Category 1 and 2 soils, gravel aquifers, high resource/environmental value	Groundwater pollution hazard
D	**Slope**	0-6% (surface effluent application), 0 -10% (subsurface effluent application)	>10% (surface effluent application), >30% subsurface effluent application	Offsite export of effluent, erosion
E	**Position of land application area in landscape[6]**	Downgradient of surface water, property boundary, recreational area	Upgradient of surface water, property boundary, recreational area	Surface water pollution hazard, offsite export of effluent
F	**Drainage**	Category 1 to 2 soils; gently sloping area	Category 6 soils, sites with visible seepage, moisture tolerant vegetation, low lying area	Groundwater pollution hazard
G	**Flood potential**	Above 1 in 20 year flood contour	Below 1 in 20 year flood contour	Offsite export of effluent, system failure, mechanical faults
H	**Geology and soils**	Category 3 and 4 soils; low porous regolith, deep uniform soils	Category 1 and 6 soils, fractured rock, gravel aquifers, highly porous regolith	Groundwater pollution hazard for porous regolith and permeable soils

Item	Site constraint items of specific concern	Constraint scale[1]		Sensitive features
		Lower	Higher	
		Examples of constraint factors[2]		
I	Landform	Hill crests, convex side slopes, and plains	Drainage plains and incised channels	Groundwater pollution hazard, resurfacing hazard
J	Application method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Offsite export of effluent, surface water pollution

A number of qualifying notes apply:

1. Scale shows the level of constraint to siting an on-site system due to the constraints identified by site and soil evaluation (SSE) evaluator or regulatory authority. See Figures R1 and R2 for examples of on-site system design boundaries and possible site constraints.
2. Examples of typical siting constraint factors that may be identified either by SSE evaluator or regulatory authority. Site constraints are not limited to this table. Other site constraints may be identified and taken into consideration when determining setback distances.
3. The level of microbial removal for any on-site treatment system needs to be determined and it should be assumed that unless disinfection is reliably used then the microbial concentrations will be similar to primary treatment. Low risk microbial quality value is based on the values given in ARC (2004), ANZECC and ARMCANZ (2000), and EPA Victoria (Guidelines for environmental management: Use of reclaimed water 2003).
4. Surface water, in this case, refers to any fresh water or geothermal water in a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in man-made drains, channels, and dams unless these are to specifically divert surface water away from the land application area. Surface water excludes any water in a pipe or tank.
5. The soil categories 1 to 6 are described in Table 5.1. Surface water or groundwater that has high resource value may include potable (human or animal) water supplies, bores, wells, and water used for recreational purposes. Surface water or groundwater of high environmental value include undisturbed or slightly disturbed aquatic ecosystems as described in ANZECC and ARMCANZ (2000).
6. The regulatory authority may reduce or increase setback distances at their discretion based on the distances of the land application up or downgradient of sensitive receptors.